

REGISTER  
OF  
THE LEHIGH UNIVERSITY.

1880-1881.

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TUITION FREE.

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SOUTH BETHLEHEM, PA.:

1881.



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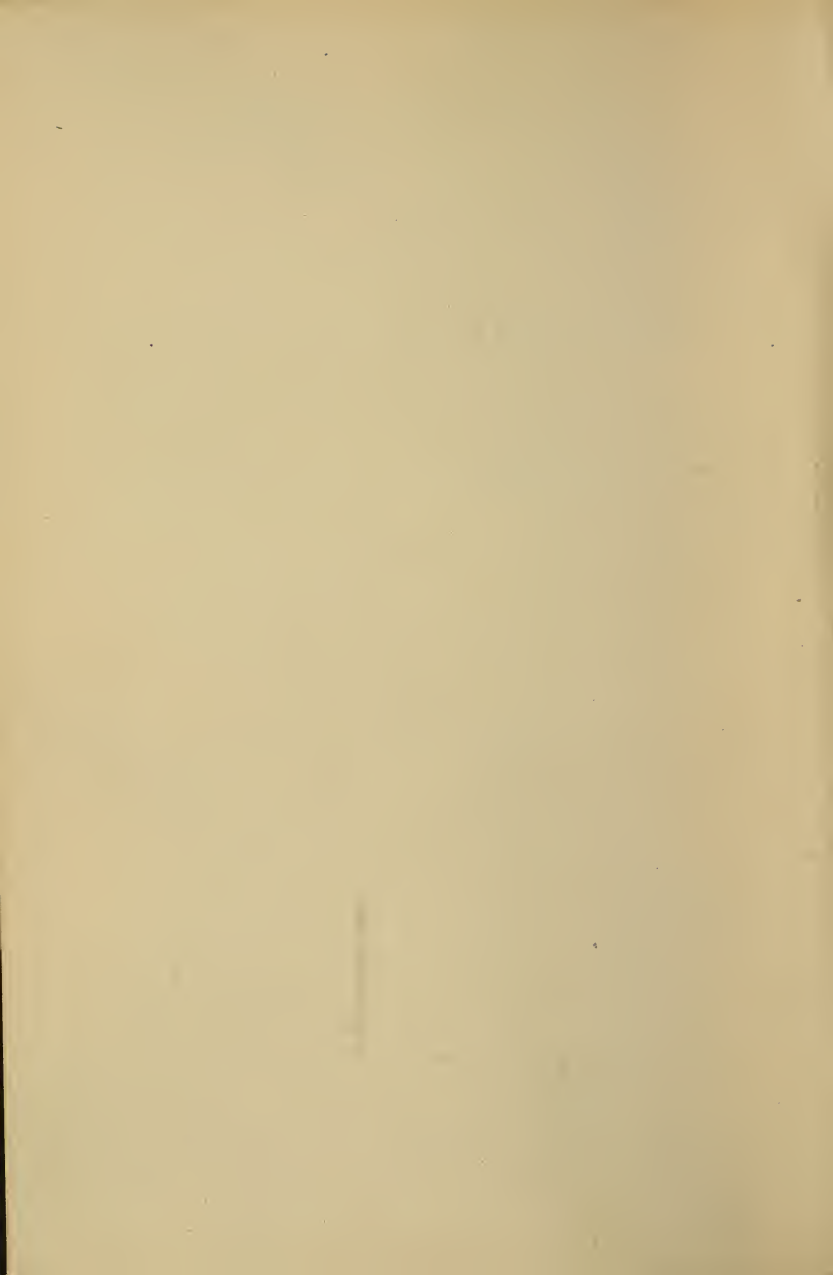
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TUITION FREE.

BETHLEHEM, PA :  
H. T. CLAUDER, PRINTER.  
1881.



## CALENDAR.

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### 1880-81.

1880.

Sept. 1.	Wednesday	.	.	First Term begins.
Oct. 14.	Thursday	.	.	Founder's Day.
Nov. 25.	Thursday	.	.	Thanksgiving Day.
Dec. 22.	Wednesday	.	.	First Term ends.

1881.

Jan. 12.	Wednesday	.	.	Second Term begins.
Feb. 22.	Tuesday	.	.	Washington's Birthday.
Mar. 2.	Ash Wednesday.			
April 14.	Thursday	.	.	Easter Holidays begin.
April 18.	Monday	.	.	Easter Holidays end.
June 6.	Monday	.	.	Annual Examinations begin.
June 17-18.	Friday and Saturday			Examinations for Admission.
June 19.	Sunday	.	.	University Sermon.
June 22.	Wednesday	.	.	Reading of Theses.
June 23.	Thursday	.	.	University Day.

### 1881-82.

1881.

Sept. 5-6.	Monday and Tuesday	.	.	Examinations for Admission.
Sept. 7.	Wednesday	.	.	First Term begins.
Oct. 13.	Thursday	.	.	Founder's Day.
Nov. 24.	Thursday	.	.	Thanksgiving Day.
Dec. 21.	Wednesday	.	.	First Term ends.

1882.

Jan. 11.	Wednesday	.	.	Second Term begins.
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H. S. GOODWIN, ESQ., *Secretary and Treasurer.*

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*Professor of English Literature, International and Constitutional Law,  
and the Philosophy of History.*

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*Professor of Chemistry and Director of University Library.*

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H. W. HARDING, A.M.,  
*Professor of Physics and Mechanics.*

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*Professor of Economic Geology.*

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*Professor of Mathematics and Astronomy.*

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*Professor of the Latin Language and Literature.*

THE REV. FREDERICK M. BIRD, A.M.,  
*Chaplain and Professor of Psychology, Christian Evidences and Rhetoric.*

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*Professor of Mining and Geology.*

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\* Will give instruction in Mining as heretofore until the vacancy in the Chair of Mining and Geology be filled.



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TRAIL GREEN, M.D., LL D.,  
*Lecturer on Physiology and Hygiene.*

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*Instructor in Graphics and Field Work.*

E. H. S. BAILEY, Ph.B.,  
*Instructor in Chemistry.*

D. E. PIERCE, C.E.,  
*Instructor in Civil and Mechanical Engineering.*

A. E. MEAKER, C.E.,  
*Instructor in Mathematics.*

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A. W. STERNER,  
*Clerk to Director of the Library.*

## STUDENTS.

Clas.—Classical Course.	C.E.—Civil Engineering.
Sci.—Scientific Course.	E.M.—Mining Engineering.
Tech.—Technical Courses.	M.E.—Mechanical Engineering.
A.C.—Analytical Chemistry.	

## GRADUATES.

Joseph Wright Adamson, C.E.,	Philadelphia.
Abram Bruner, E.M.,	Bethlehem.
Thomas Hughlett Harcastle, B.A.,	Easton, Md.
Harvey Stever Houskeeper, B.A.,	South Bethlehem.
Leonard Blakslee Treharn, B.A.,	Mauch Chunk.

## SENIOR CLASS.

	SCHOOL.	RESIDENCE.
Charles Wallar Abbott,	C.E.,	Bethlehem.
✓ William Simon Cranz,	A.C.,	Akron, O.
✓ Alexander Patrick Crilly,	Clas.,	Allentown.
✓ Thomas Morgan Eynon, Jr.,	M.E.,	South Bethlehem.
✓ Charles Weed Gray,	A.C.,	New York City.
✓ Benjamin Franklin Haldeman,	E.M.,	Philadelphia.
✓ Lewis Stockton,	Clas.,	Phoenixville.

## JUNIOR CLASS.

	SCHOOL.	RESIDENCE.
Edward Malcolm Henry,	C.E.,	Pawtucket, R. I.
Charles Comstock Hopkins,	Sci.,	Woodhull, N. Y.
Elmer Henry Lawall,	C.E.,	Bethlehem.

	SCHOOL.	RESIDENCE.
Robert Thomas Morrow, Jr.,	C.E.,	Oswego, N. Y.
Eugene Ricksecker,	C.E.,	Canal Dover, O.
John Dougherty Ruff,	E.M.,	Philadelphia.
Samuel Brenton Sickler,	C.E.,	Tunkhannock.
Martin Wittmer,	E.M.,	Etna.

## SOPHOMORE CLASS.

	SCHOOL.	RESIDENCE.
Enos Kellar Bachman,	E.M.,	Pottstown.
John Thomas Bourke,	E.M.,	Youngstown, O.
Walter Briggs,	Clas.,	Scranton.
Elmer Ellsworth Brosius,	E.M.,	Lewistown.
Harry Augustus Butler,	Sci.,	Mauch Chunk.
Hedley Vicars Cooke,	Clas.,	Bethlehem.
Francis Joseph Crilly,	Clas.,	Allentown.
Francis Wharton Dalrymple,	C.E.,	Lock Haven.
Timothy James Donahoe,	E.M.,	South Bethlehem.
James Joseph Doran,	A.C.,	South Bethlehem.
George Francis Duck,	E.M.,	Englewood, N. J.
Louis Oscar Emmerich,	E.M.,	New York City.
Alfred Edmond Forstall,	M.E.,	New Orleans, La.
Nathaniel Oliver Goldsmith,	M.E.,	Glendale, O.
William Theodore Goodnow,	C.E.,	Toledo, O.
John Daniel Hoffman,	Clas.,	Bethlehem.
George Gowen Hood,	C.E.,	Philadelphia.
Garret Linderman Hoppes,	M.E.,	Bethlehem.
James Henry James,	E.M.,	Rockland, Mich.
William Dean Janney,	C.E.,	Baltimore, Md.
Preston Albert Lambert,	Clas.,	Seidersville.
George Leighton,	C.E.,	Glenburn.
John Wood Leithead,	C.E.,	Rockland, Del.
Edwin Francis Miller,	M.E.,	Lionville.

	SCHOOL.	RESIDENCE.
Wilson Franklin More,	Clas.,	Bethlehem.
Nelson Morrow,	M.E.,	Oswego, N. Y.
Thomas Nicholson, Jr.,	M.E.,	Jenkintown.
George Spencer Patterson,	E.M.,	Mahanoy City.
Richard Rembrandt Peale,	Sci.,	Lock Haven.
John Raymond Pepin,	E.M.,	New Orleans, La.
Henry Allebach Potterfield,	E.M.,	Emlenton.
Francis Henry Purnell,	C.E.,	Berlin, Md.
Jesse Wilford Reno,	E.M.,	Boston, Mass.
Charles Loomis Rogers,	M.E.,	Utica, N. Y.
John Ruddle,	M.E.,	East Mauch Chunk.
Barry Searle,	Sci.,	Montrose.
Charles Henry Stinson,	Sci.,	Norristown.
Robert Stinson,	Sci.,	Norristown.
Fung Kai Whang,	C.E.,	Ningpo China.
Wyle Thompson Wilson,	C.E.,	Philadelphia.
Chung Liang Wong,	E.M.,	Canton, China.

## FRESHMAN CLASS.

	COURSE.	RESIDENCE.
Warren Howard Allen,	Sci.,	Athens.
Allen Ames,	Tech.,	Oswego, N. Y.
Harrison Link Auchmuty,	Sci.,	Millersburg.
Henry Dearborn Ayres,	Tech.,	Baltimore, Md.
George Nathan Bursmith,	Tech.,	Westfield, N. J.
Yung Kwi Chin,	Tech.,	Kwong Tung, China.
Robert Grier Cooke,	Clas.,	Bethlehem.
Henry Bowman Douglas,	Tech.,	Fort Cameron, Utah.
John Roberts Engelbert,	Tech.,	Wiconisco.
Louis Focht,	Tech.,	Bethlehem.
William Banks Foote,	Tech.,	Rochester, N. Y.
William Henry Godshall,	Sci.,	Lansdale.

	COURSE.	RESIDENCE.
James McKinley Graeff,	Tech.,	Pottsville.
Charles Owens Haines,	Tech.,	Savannah, Ga.
Harry Tallman Harper,	Tech.,	Wiconisco.
Harry Hurd Hilligass,	Tech.,	Reading.
Edwin Franklin Hofford,	Tech.,	Lehighton.
John Andrew Jardine,	Tech.,	Alburtis.
James Warner Kellogg,	Tech.,	Atchison, Kan.
David Garrett Kerr,	Tech.,	Wilkesburg.
Howard Insley Kuntz,	Sci.,	Bath.
Frederick Bowman Langston, Jr.,	Tech.,	Bethlehem.
William Langston,	Tech.,	Bethlehem,
Robert Packer Linderman,	Tech.,	South Bethlehem.
David Rinehart Mehaffey,	Tech.,	Marietta.
Joseph Franklin Merkle,	Tech.,	Cressona.
Samuel Denton Morford,	Tech.,	Newton, N. J.
James Alexander Morrow,	Tech.,	Tyrone.
Harry Krider Myers,	Tech.,	Tyrone.
Albino Rosendo Nuncio,	Tech.,	Saltillo, Mexico.
James Ward Packard,	Tech.,	Warren, O.
William Frederick Detwiller Pascoe,	Tech.,	Friedensville.
William Richmond Pinckney,	Clas.,	Stateburg, S. C.
William Sherman Roth,	Tech.,	Allentown.
Lewis Buckley Semple,	Clas.,	South Bethlehem.
Augustus Parker Smith,	Tech.,	Norwich, Conn.
Murray Stewart,	Tech.,	Reading.
Robert Daniel Stewart,	Tech.,	Lancaster.
Henry Sterner Strunk,	Sci.,	South Bethlehem.
Clinton Brazil Van Tuyl,	Tech.,	Rio de Janeiro, Brazil.
Richard Washington Walker,	Tech.,	Barneston.
James Angus Watson,	Tech.,	Catonsville, Md.
De Forest Curtis Williams,	Tech.,	Bennington, Vt.
Rollin Henry Wilbur,	Tech.,	South Bethlehem.

## SPECIAL STUDENTS.

	SCHOOL.	RESIDENCE.
William Hutton Blauvelt,	A.C.,	Tappentown, N. Y.
William Butler,	C.E.,	Uwehlan,
Felipè Cárdenas,	C.E.,	Saltillo, Mexico.
Charles Clemency Cook,	A.C.,	Canton, O.
John Sayre Cox.	A.C.,	Bethlehem.
George Burton Fairchild,	A.C.,	Bethel, Conn.
Charles Augustus Weakley.	C.E.,	York.

## SUMMARY OF STUDENTS.

Graduates,	5
Seniors,	7
Juniors,	8
Sophomores,	41
Freshmen,	44
Specials,	7
Total,	112

# THE LEHIGH UNIVERSITY.

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## ORIGIN.

The Hon. ASA PACKER of Mauch Chunk, during the year 1865, appropriated the sum of Five Hundred Thousand Dollars, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational institution in the rich and beautiful Valley of the Lehigh. From this foundation rose THE LEHIGH UNIVERSITY, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime, Judge Packer by his last will secured to the University an endowment of \$1,500,000, and to the University Library one of \$500,000.

## DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete technical education for those professions which had developed the peculiar resources of the surrounding region. Instruction was to be liberally provided in Civil, Mechanical and Mining Engineering, Chemistry, Metallurgy, and in all needful collateral studies. French and German were made important elements in the collegiate course. A School of General Literature was part of the original plan, together with tuition in the ancient Classics. The Institution was freely opened to pupils from every part of the country and the world.

## FREE TUITION.

It will be observed that all these educational facilities are provided without charge. Through the generosity of the Founder, the Trustees

were enabled, in 1871, to declare tuition FREE in all branches and classes. The Lehigh University is open to young men of suitable talents and training from every part of our own land and of the world. To this fact the attention of the pupils of our public schools and of the graduates of classical institutions is specially called. Thus is offered, *without charge*, every facility for studying the professions of the Civil, Mechanical and Mining Engineer, and of the Metallurgist and Analytical Chemist. In the Classical and Scientific departments of the School of General Literature instruction is given to those who wish to become lawyers, clergymen, physicians, editors, or merchants.

### PUBLIC WORSHIP.

Prayers are held in the Chapel every morning, and all the students are required to be present.

Divine Service is held on every Sunday morning, according to the forms of the Protestant Episcopal Church, in the Chapel of the University. Attendance at this service is required of every student, except in case of those connected with other religious bodies, to whom the President will grant permission at the beginning of each term (if requested by the parent or guardian, or by the student himself if he be 21 years of age) to attend during that term the place of worship of the body with which he is connected, where attendance on Sunday morning will be required.

### SITE.

The situation of the Institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises, it possesses some of the richest iron and coal mines in our land, it is accessible to the great mechanical works of New York and Philadelphia, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

### COMMUNICATIONS.

The University Buildings are about a half-mile from the depot, at the junction of the Lehigh Valley and North Pennsylvania Railroads. New York is ninety-two, and Philadelphia fifty-four miles distant.



## BUILDINGS.

Packer Hall, named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the Lehigh Mountain. Built of handsome stone, it presents to the north a noble and imposing front. At the western extremity is a belfry tower containing the President's room and the archive room. The eastern end is a large advanced wing in which are lecture and recitation rooms, and also a thoroughly equipped chemical laboratory. The central portion, eighty feet long, contains the Chapel, Drawing Room and Cabinets. To the east of Packer Hall stands the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter. To the west, within the grounds, are the houses of the President and Professors, comports in architecture with Packer Hall. Fronting on Packer Avenue stand Christmas Hall and Saucon Hall, commodious brick edifices, containing students' rooms, heated by steam and lighted by gas, and a mess hall. Near Broadhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument and astronomical clock.

## EXPENSES.

Tuition is FREE in all branches and classes. Books, materials, paper, pencils, chemical materials used in the analytical laboratory, and drawing instruments, are furnished by the student.

Rooms and board are provided in the University buildings, under the following rules:

1. The amount of room-rent, board, &c., for each term, must be paid in advance to the Treasurer of the Executive Committee, who will furnish the student with board ticket and key of room.

2. The charge for board and room-rent shall be \$5 per week. Where two students occupy a room jointly, the charge shall be \$4.50 per week for each.

3. The charge for board without room shall be \$4 per week. The charge for room without board shall be \$2 per week for each room.

4. These prices include gas and heat.

5. Meal tickets will be furnished by the steward to students or friends visiting them, at 50 cents each, payable in advance to the steward.

6. The choice of rooms shall be in the order of the classes; in any class the first applicant to have the first choice.

7. Students may retain their rooms from year to year by giving notice of their intention so to do at the close of the academic year, and by procuring their tickets therefor on or before the first day of the next term.

8. Students are required to keep their rooms in order, or to employ some proper person to do so for them.

9. No furniture for rooms will be provided by the University.

10. The use of kerosene, coal oil or burning fluid, in any of the buildings, is prohibited.

NOTE.—Where clubs are formed the cost of board need not exceed \$3.50 per week.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included.

Board for 40 weeks . . . . .	from \$140 to \$180
Room rent, with fuel and lights . . . . .	40 " 80
Care of room and use of furniture . . . . .	5 " 20
Washing and incidentals . . . . .	15 " 25
Books, stationery, etc. . . . .	20 " 40
Total . . . . .	<hr/> \$220 to \$345 <hr/>

## ADMISSION OF STUDENTS.

Application for admission into the University should be made to the President, from whom all information may be obtained.

### REGULAR STUDENTS.

All applicants for regular standing in the classes or schools must be prepared to pass an examination according to the programme of studies. From this it will be seen that a student may be admitted at any time if able to pass a satisfactory examination in the studies already pursued by his class. The only exception will be in the case of a young man who is very nearly but not thoroughly prepared to enter in full standing and who may, at the discretion of the Faculty, be admitted conditionally, to make up his deficiencies by extra study. When they are made up, he will be received in full standing into his class.

*SPECIAL STUDENTS*

May enter, selecting such studies as they please, upon a satisfactory examination, with the sanction of the Faculty.

*RESIDENT GRADUATES.*

Graduates who desire to pursue their studies under the direction of the Faculty, may attend the lectures in any of the Departments. Although not bound by University hours, they will be required to obey the directions of the President and of the Professors in reference to their departments, and will have their names placed upon the Annual Register.

## REQUIREMENTS FOR ADMISSION.

All candidates for admission to the Freshman Class or to any special course must be at least sixteen years of age, must present testimonials of good moral character, and pass satisfactory examinations in the following subjects:

1. *English Grammar*, including Orthography and Syntax.
2. *Geography*, political and physical. In physical, Mitchell's or Guyot's or equivalent.
3. *United States History*.
4. *Arithmetic*, including the metric system of weights and measures.
5. *Algebra*, through equations of the second degree.
6. *Chauvenet's Geometry*, or Davies' Legendre, six books, (Chauvenet preferred.)

Candidates for the Classical Course are examined also in

7. *Latin Grammar*, (Harkness or Allen and Greenough preferred.)
8. *Cæsar*, four books of the Gallic war.
9. *Cicero*, six orations, including the four against Cataline.
10. *Virgil*, first six books of the Aeneid, including Prosody; \*Bucolics.

11. \*The translation, at sight, of passages from Cicero or Cæsar.

12. \*The translation of English into Latin. (As special importance is given this part of the examination, it is suggested to teachers that they connect exercises in making Latin, both oral and written, with all the studies of the preparatory course.)

13. \**Roman History*, Creighton's Primer of Roman History is suggested as indicating the amount required.

14. *Greek Grammar*, (Goodwin's preferred.)

15. *Xenophon*, *Anabasis*, four books.

16. *Homer*, *Iliad*, three books, including prosody.

17. \*The translation at sight of a passage from some work of Xenophon.

18. \**Greek History*, Fyffe's Primer of Greek History is suggested.

19. \*Writing Greek with accents.

The pronunciation of Greek according to the written accents is followed in the University and it is desirable that students preparing to enter be taught this system.

\* Subjects marked with an asterisk will not be required until the examination in June, 1882.

## PROGRAMME OF STUDIES,

SHOWING THE NUMBER OF HOURS AND EXERCISES PER WEEK  
FOR EACH SUBJECT, AND THE TEXT-BOOKS USED.

The following is presented as the general programme of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are also generally mentioned. The number of exercises per week in each subject is indicated by the figure in parenthesis immediately following.

Two hours of Drawing, three of work in the Laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

## THE SCHOOL OF GENERAL LITERATURE.

This school is intended to correspond to the course long established in our older colleges, modified by the needs and requirements of modern culture. Its object is to impart a comprehensive and liberal education to those who design to enter upon professional rather than technical pursuits.

It comprises two distinct courses: I. The Classical Course.  
II The Scientific Course.

## THE CLASSICAL COURSE.

This course is chiefly designed for those who propose to study Law and Theology; it includes full and rigorous instruction in the Ancient Classics, in Elementary Science and in General Literature. The study of Mathematics in this course embraces Algebra, Geometry, Trigonometry, Analytical Geometry, and the Calculus. The programme includes Physics, Chemistry and Elementary Mechanics. There are also full courses in History, in the Science of Language and in the origin and growth of the English Language. There are also lectures on Psychology, the Christian Evidences, International and Constitutional Law and Political Economy. Lectures on English Literature are supplemented by critical readings of the standard English authors. The graduate in this course obtains the degree of B. A. (Bachelor of Arts).

## FRESHMAN CLASS.

## FIRST TERM.

*Latin*.—Livy. Latin prose composition. Leighton's History of Rome to Chap. XXX. (4)

*Greek*.—Homer: Odyssey. Prosody. Testament. Smith's Greek History. (4)

*History*.—Weber's Outlines of History. (2)

*Mathematics*.—Chauvenet's Geometry (completed). (4)

*Essays and Declamations*. (1)

*Physiology and Health*.—Lectures.

## SECOND TERM.

*Latin*.—Cicero: Essays and Letters. Horace: Odes and Epodes. Latin Prosody. Leighton's Rome to Chap. LVII. (4)

*Greek*.—Xenophon: Memorabilia of Socrates. Testament. Smith's Greek History. (4)

*History*.—Weber's Outlines of History. (2)

*Mathematics*.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

*Essays and Declamations*. (1)

*Physiology and Health*.—Lectures.

## SOPHOMORE CLASS.

## FIRST TERM.

*Latin*.—Tacitus: Agricola and Germania. Prose Composition. Roman History completed. (3)

*Greek*.—Felton's Greek Historians. Smith's Greek History. (4)

*English*.—Coppée's English Literature. (4)

*Mathematics*.—Analytical Geometry: Olney's General Geometry. (4)

*Essays and Original Orations*. (1)

## SECOND TERM.

*Latin*.—Quintilian: Book X. Horace: Satires and Epistles. Bender's Roman Literature. (4)

*Greek*.—Euripides: Medea. Greek Antiquities. (3)

*Rhetoric*.—Coppée's Rhetoric. (2)

*English*.—Lectures on the Science of Language. Müller and Farrar. (2)

*Mathematics*.—Differential and Integral Calculus: Olney. (4)

*Essays and Original Orations*. (1)

## JUNIOR CLASS.

## FIRST TERM.

*Latin*.—Plautus and Terence. Wilkin's Roman Antiquities. (3)

*Greek*.—Sophocles: Electra. (2)

*History*.—Lectures. (4)

*Logic*.—Coppée's Logic. (3)

*Fine Arts*.—Lectures. (1)

*Physics*.—Mechanics, with Lectures and Laboratory Practice. (2)

*Essays and Original Orations*. (1)

## SECOND TERM.

*Latin*.—Juvenal and Persius. Select Epistles of Pliny. Cruttwell's History of Roman Literature. (2)

*Greek*.—Aristophanes: Clouds. Greek Literature. (2)

*History*.—Lectures on the Philosophy of History. (2)

*English*.—Lectures on the English Language. Schele de Vere. (1)

*Chemistry*.—Lectures. Fownes' Elementary Chemistry. (3)

*Physics*.—Galvanism, Acoustics, Light; with Lectures and Laboratory Practice. (5)

*Essays and Original Orations*.—(1)

## SENIOR CLASS.

## FIRST TERM.

*Latin*.—Horace: Ars Poetica. Lucretius, with Lectures. Roman Literature continued. (2)

*Greek*.—Theocritus. Greek Literature. (2)

*Christian Evidences*.—Lectures. (1)

*International Law and History*.—Lectures. (1)

*English Literature and History*.—Lectures. (3)

*Descriptive Astronomy*.—Loomis' Treatise, with Lectures. (3)

*Physics*.—Heat, Meteorology, Barometrical Leveling and Measurement of Heights, Magnetism and Statical Electricity. Lectures with Laboratory Practice. (3)

*Essays and Original Orations*.—(1)

## SECOND TERM.

*Latin*.—Select Poems from lyric, elegiac and epigrammatic poets. Cicero de Officiis with lectures. Roman Literature completed. (3)

*Greek*.—Demosthenes: Public Orations. Greek literature. (2)

*Psychology and Christian Evidences*.—Lectures. (2)

*Political Economy*.—Lectures. (1)

*Constitutional Law and History*.—Lectures. (2)

*Chemistry*.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (3)

*Geology*.—Lectures. Dana. (2)

*Preparation of Theses*.

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THE SCIENTIFIC COURSE.

This course comprises most of the studies of the Classical Course, and is chiefly intended for those who do not desire to study Latin and Greek. These being omitted, extended instruction is given in French and German, and in the sciences.

This Course will be particularly valuable to those who design to enter upon commercial pursuits, or matters of general industry. The degree of B. Sc. (Bachelor of Science) is conferred upon the graduate in this course.



## FRESHMAN CLASS.

## FIRST TERM.

*Mathematics*.—Chauvenet's Geometry, (completed). (4)

*French*.—Fasquelle's Introductory French Course. Gibert's second French Reader. (3)

*German*.—Otto's Grammar. Writing in German Text. Translation into English. (4)

*History*.—Weber's Outlines of History. (2)

*Drawing*.—Elementary projections, shading and lettering. (2)

*Essays and Declamations*. (1)

*Physiology and Health*—Lectures.

## SECOND TERM.

*Mathematics*.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables (2)

*French*.—Languillier's and Monsanto's Practical French Course. Chouquet's First Readings from Modern French writers. (3)

*German*.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

*History*.—Weber's Outlines of History. (2)

*Drawing*.—Projection drawing, with practical problems. (2)

*Essays and Declamations*. (1)

*Physiology and Health*.—Lectures.

## SOPHOMORE CLASS.

## FIRST TERM.

*Mathematics*.—Analytical Geometry: Olney's General Geometry. (4)

*French*.—Languillier's and Monsanto's Practical French Course. Chouquet's First Readings from Modern French writers. Practical Exercises in Translation from French into English. (3)

*German*.—Otto's German Grammar. Schlegel's second Classical Reader. Practical Exercises in Translation from German into English. (3)

*English*—Coppée's English Literature. (4)

*Essays and Declamations*. (1)



## SECOND TERM.

*Mathematics.*—Differential and Integral Calculus: Olney. (4)

*Descriptive Geometry.*—General Orthographic Projections, with practical problems: Church. (3)

*French.*—Poitevin: Grammaire Élémentaire, in French. Written Exercises. Chapsal: Leçons et Modèles de Littérature Française. (2)

*German.*—Scientific Readings. Exercises. (2)

*Rhetoric.*—Coppée's Rhetoric. (2)

*English.*—Lectures on the Science of Language. Müller and Farrar. (2)

*Essays and Original Orations.* (1)

## JUNIOR CLASS.

## FIRST TERM.

*Physics.*—Mechanics, with Lectures and Laboratory Practice. (2)

*Anatomy and Physiology.*—Lectures. (1)

*French.*—Poitevin, continued. Exercises. Systematic Scientific Readings. Chapsal continued. (2)

*German.*—Systematic Scientific Readings. Translation from German into English. Compositions in German. (2)

*History.*—Lectures. (4)

*Logic.*—Coppée's Logic. (3)

*Fine Arts.*—Lectures. (1)

*Essays and Original Orations.* (1)

## SECOND TERM.

*Chemistry.*—Lectures. Fownes' Elementary Chemistry. (3)

*Physics.*—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

*French.*—Systematic Readings. Composition. Damogeot: Littérature Française. (2)

*German.*—Systematic Scientific Readings. Compositions. Translations. Scherr: Geschichte der deutschen Literatur. (2)

*History.*—Lectures on the Philosophy of History. (2)

*English.*—Lectures on the English Language. Schele de Vere. (1)

*Essays and Original Orations.* (1)

## SENIOR CLASS.

## FIRST TERM.

*Physics*.—Heat, Magnetism and Statical Electricity. With Lectures and Laboratory Practice. (3)

*Descriptive Astronomy*.—Loomis' Treatise, with Lectures. (3)

*Chemistry*.—Lectures. (2)

*Crystallography*.—Lectures with Practical Exercises in the Determination of Crystals. (2)

*Christian Evidences*.—Lectures. (1)

*International Law*.—Lectures. (1)

*English Literature and History*.—Lectures. (3)

*Essays and Original Orations*.—(1)

## SECOND TERM.

*Chemistry*.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis (3)

*Mineralogy*.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

*Surveying*.—Land Surveying. Gillespie. (3)

*Geology*.—Lectures. Dana's Treatise. (2)

*Psychology and Christian Evidences*.—Lectures. (2)

*Political Economy*.—Lectures. (1)

*Constitutional Law and History*.—Lectures. (2)

*Preparation of Theses*.

## TECHNICAL COURSES.

The first three terms (one year and a half) have the same curriculum of studies for all the Technical Schools. At the end of that time the student selects his school and follows the programme laid down for that School.

## FRESHMAN CLASS.

## FIRST TERM.

*Mathematics*.—Chauvenet's Geometry, (completed). (4)

*Physics*.—Mechanics, with Lectures and Laboratory Practicæ. (2)

*French*.—Fasquelle's Introductory French Course. Gibert's second French Reader. (3)

*German*.—Otto's Grammar. Writing in German Text. Translation of German into English. (4)

*Drawing*.—Elementary projections, shading and lettering. (2)

*Essays and Declamations*. (1)

*Physiology and Health*.—Lectures.

#### SECOND TERM.

*Mathematics*.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

*Chemistry*.—Lectures. Fownes' Elementary Chemistry. (3)

*French*.—Languillier's and Monsanto's Practical French Course. Chouquet's first Readings from Modern French writers. (3)

*German*.—Otto's Grammar. Schlegel's second Classical German Reader. (2)

*Drawing*.—Projection Drawing with practical problems. (2)

*Essays and Declamations*. (1)

*Physiology and Health*.—Lectures.

#### SOPHOMORE CLASS.

##### FIRST TERM.

*Mathematics*.—Analytical Geometry: Olney's General Geometry. (4)

*Chemistry*.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (5)

*Physics*.—Heat, Meteorology, Magnetism and Statical Electricity, with Lectures and Laboratory Practice. (3)

*French or German*.—As in the Scientific Course of the School of General Literature. (3)

*Essays and Original Orations*. (1)

#### THE SCHOOL OF CIVIL ENGINEERING.

The general scope of this School comprises the higher branches of the applied mechanics and mathematics, together with the principles of construction and exercises in mapping, drawing and designing. The student is made acquainted with the strength of materials, including the theory of elasticity or flexure, the principles of con-

struction of roof-trusses, beams, girders and bridges, as well as the practical designing of such structures, the determination of their proper dimensions and the preparation of working drawings. Under this head belongs also the theory of the stability of structures, including the theory of the arch and the construction of retaining walls; the principles of hydrostatics and hydraulics with their applications to vertical water wheels and turbines.

In all cases, practical examples, such as occur in actual engineering practice, are taken up and discussed, and, together with the analytical or algebraic methods, the student is also instructed in practical graphical solutions of the various problems, wherever such solutions present a special value in practice. Much time is devoted to surveying operations and to actual practice in the field. Profiles, plans of topographical surveys, contour maps, and railroad charts, are made. The practical operations connected with the reconnoissance, location and surveys of roads, canals and railroads, such as cross sectioning, setting grade stakes, laying out of curves and calculation of excavation and embankment, are fully illustrated in the field. Thorough instruction is given in drawing, the construction of working drawings of structures, topography and hydrographical charts.

Attention is also paid to the application of the general principles of the science of engineering, or to engineering considered as an art. Under this latter head may be classed the composition and qualities of materials used in construction, iron, steel, wood, stone; their dressing and preservation; foundations, earth and rock-work; harbor and river improvements, drainage, collection and distribution of water.

So much of Mechanical Engineering is necessarily included, as refers to the construction of bridges, and the special machinery and appliances used in the erection of structures.

Designs for, and reviews of, special structures, specifications and estimates of quantities and cost, and the preparation of a graduation Thesis giving evidence of satisfactory attainments, complete the course. The graduate of this School will receive the degree of C. E. (Civil Engineer.)

Graduates of the School of Civil Engineering, by remaining one year and pursuing one of the courses of studies elsewhere laid down may receive the degree of M. E. (Mechanical Engineer) or E. M. (Engineer of Mines.)

## SOPHOMORE CLASS.

## SECOND TERM.

*Mathematics*.—Differential and Integral Calculus: Olney. (4)

*Descriptive Geometry*.—General Orthographic Projections, with practical problems. Church. (3)

*Surveying*.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

*Civil Engineering*.—Trautwine's Engineer's Pocket Book. (1)

*Physics*—Galvanism, Acoustics, Light: Ganot, with Lectures and Laboratory Practice. (5)

*Essays*.

## JUNIOR CLASS.

## FIRST TERM.

*Mathematics*.—Integral Calculus: Courtenay. (2)

*Mechanics*.—Smith. Mathematical Theory of Motion. Science of Motion in General. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

*Descriptive Geometry*.—Warped Surfaces. Shades and Shadows. Isometric Drawing. Church. (3)

*Surveying*—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

*Crystallography*.—Lectures. (1)

*Essays*.

## SECOND TERM.

*Strength of Materials*.—Theory of columns, shafts, beams, boilers, retaining walls; &c. (3)

*Drawing*.—Stone Cutting. Drawings of structures from actual measurements. (4)

*Mine Surveying*.—Practical work in a coal mine. (1)

*Rail Road Surveying*.—Location of a Railroad Line. Profile, Map and Estimate of Cost. (3)

*Mineralogy*.—Descriptive and Determinative, with Practice. E. S. Dana. (3)

*Civil Engineering*.—Descriptions of Engineering structures, with reports and essays. (2)

## SENIOR CLASS.

## FIRST TERM.

*Roofs and Bridges.*—Theory of strains. Investigation of stability of structures. (3)

*Graphical Statics.*—Analysis of roof trusses and arches. (2)

*Civil Engineering.*—Principles of Construction and Design. Reports on existing structures. Designs and estimates of cost. Visits of Inspection. (3)

*Surveying.*—Hydrography and Geodesy. (2)

*Astronomy*—Descriptive Astronomy: Loomis. (3)

*Christian Evidences.*—Lectures. (1)

*English Literature and History.*—Lectures. (2)

## SECOND TERM.

*Hydraulics.*—Flow of water in pipes and rivers. Water supply engineering. (3)

*Steam Engine.*—The locomotive. (2)

*Civil Engineering.*—Specifications and Contracts. Original Designs and Estimates for Engineering Projects. Visits of Inspection. (5)

*Astronomy.*—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

*Geology.*—Lectures. Dana. (2)

*Preparation of Theses.*

POST GRADUATE COURSE FOR MECHANICAL ENGINEERS  
FOR THE DEGREE OF CIVIL ENGINEER.

## FIRST TERM.

*Surveying.*—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

*Civil Engineering.*—Principles of Construction. Erection of Structures. Reports on, and Designs for, Simple Structures. (3)

*Surveying.*—Hydrography and Geodesy. (2)

## SECOND TERM.

*Drawing.* Stone Cutting. (2)

*Rail Road Surveying.*—Mine Surveying. Road and Railroad Sur-

veying. Location of a Railroad Line. Profile, Map and Estimate of Cost. Henck. (3)

*Civil Engineering*.—Original Designs and Estimates for Engineering Projects. (3)

*Mine Surveying*.—Practical Work in a coal mine. (1)

*Astronomy*.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

*Preparation of Theses.*

## THE SCHOOL OF MECHANICAL ENGINEERING.

While the problems which the Civil Engineer is called upon to solve are mainly statical problems, involving the idea of rest or equilibrium, and the ends to be obtained in his constructions are stiffness, rigidity and immobility; the object of the Mechanical or Dynamical Engineer, on the other hand, is not to avoid or prevent but to cause motion, not to oppose the action of the forces of nature, but so to guide and use them as to obtain the desired results in the best manner and with the least expenditure of force and material. The two professions are thus, in the nature of the problem with which they have to do, to a certain extent antithetical. The sciences, however, of which both make use, and the fundamental principles, by the application of which the desired results are in each case obtained, are, to a considerable extent, identical.

Thus, the higher branches of the mathematics and of applied mechanics, as well as the principles of constructions, are common to both Schools. So also as regards the theory of elasticity or flexure and the strength and properties of materials. Much, therefore, of the course as already indicated for the School of Civil Engineering, finds here also a place, as will appear from an examination of the detailed course of study given below.

In the practical application of the principles common to both, however, the two Schools diverge. Thus special attention is directed to the applications of the principles of mechanics to machinery, in the construction of stationary, locomotive and marine engines, hydraulic motors of various kinds, blast furnaces and their appurtenances, foundries, rolling mills and steel works. Information is



afforded of the methods of casting and working in iron and other metals, and of making and using the tools employed in these processes.

Much attention is paid to the execution of working drawings, and the theory of mechanism. The proximity of numerous blast furnaces, rolling mills, foundries, machine shops and factories, enables the student to see the actual workings of such establishments and to obtain valuable practical information in the various branches of mechanical engineering.

Visits of inspection to the workshops, mills and blast furnaces in the neighborhood, with explanations of the machinery and tools used, form an important feature of the course.

The graduate in this School will receive the degree of M. E. (Mechanical Engineer.)

Graduates of the School of Mechanical Engineering, by remaining an additional year and pursuing the course of studies elsewhere laid down, may receive the degree of C. E. (Civil Engineer.)

#### SOPHOMORE CLASS.

##### SECOND TERM.

*Mathematics.*—Differential and Integral Calculus: Olney. (4)

*Descriptive Geometry*—General Orthographic Projections, with practical problems. Church. (3)

*Surveying.*—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

*Physics.*—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

*Mechanical Engineering.*—Machine Tools and Processes. Rose. (1)  
*Essays.*

#### JUNIOR CLASS.

##### FIRST TERM.

*Mathematics*—Integral Calculus: Courtenay. (2)

*Mechanics.*—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)



*Descriptive Geometry*—Warped Surfaces. Shades and Shadows. Isometric Drawing Church. (3)

*Mechanical Engineering*.—Machine Drawing. Working Drawings. Pattern Making, Moulding and Casting. Rose. (5)

*Crystallography*.—Lectures. (1)

*Essays*.

#### SECOND TERM.

*Strength of Materials*.—Theory of columns, beams, shafts, boilers, retaining walls, &c. (3)

*Kinematics*.—Principles of Mechanism. Goodeve. (2)

*Drawing*.—Sketches of Machines. Working Drawings of Machinery. Elements of Machine Design. (4)

*Metallurgy*.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

*Mineralogy*.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

*Mechanical Engineering*—Essays upon Mechanical Topics. (1)

#### SENIOR CLASS.

##### FIRST TERM.

*Roofs and Bridges*.—Theory of strains. Investigation of stability of structures. (3)

*Graphical Statics*—Analysis of roof trusses and arches. (2)

*Mechanical Engineering*.—Forging and Riveting. Workshop Appliances and Processes. Reports on, and Designs for, Simple Machines. Visits of Inspection. (3)

*Thermodynamics*.—General Principles. Air Engines. (2)

*Astronomy*.—Descriptive Astronomy: Loomis. (3)

*Christian Evidences*.—Lectures. (1)

*English Literature and History*.—Lectures. (2)

##### SECOND TERM.

*Hydraulics*.—Flow of water in pipes and rivers. Water supply engineering. (2)

*Steam Engine*.—The Locomotive. Proportions of the Steam Engine. (3)

*Kinematics*.—Link and Valve Motion. Auchincloss. (2)

*Mechanical Engineering.*—Specifications and Contracts. Original Designs and Estimates for Machines. Visits of Inspection. (5)

*Geology.*—Lectures. Dana. (2)

*Preparation of Theses.*

## POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MECHANICAL ENGINEER.

### FIRST TERM.

*Drawing.*—Machine Drawing. Working Drawings. (3)

*Mechanical Engineering.*—Pattern Making, Molding and Casting. Forging and Riveting. Workshop Appliances and Processes. Reports on, and Designs for, Simple Machines. (5)

*Thermodynamics.*—Theory of Heat. Shann. (2)

### SECOND TERM.

*Kinematics.*—Link and Valve Motion. Auchincloss. (2)

*Drawing.*—Sketches of Machines. Working Drawings. Elements of Machine Design. (2)

*Mechanical Engineering.*—Original Designs and Estimates for Machines. (3)

*Metallurgy.*—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

*Preparation of Theses.*

## THE SCHOOL OF MINING AND METALLURGY.

The full course in this School comprises, beside the mathematical, physical, chemical and literary studies necessary to all technical education, courses in Mining, Metallurgy, Geology, Mineralogy, Machines, qualitative and quantitative Analysis, Assaying, Blow-pipe Analysis, topographical and mine Surveying and Drawing. On account of the great number and scope of the studies necessary to the completion of the full course, it is four years and a half in length.

The graduate in this School, who has taken the full course, will receive the degree of E. M. (Engineer of Mines)

A partial course may be taken in this School by those who wish to pursue the study of Metallurgy. The course of Metallurgy in-

cludes the studies of the full course, except those of Mining and Surveying. The length of the course is four years.

The graduate of this School in the Metallurgical course will receive the degree of Metallt. (Metallurgist.)

A Post Graduate course has been arranged in this School, comprising courses in Mining, Metallurgy, Chemical Analysis and Blow-pipe Analysis, with supplementary courses in Geology and Mineralogy. Graduates in the School of Civil Engineering, by remaining one year and taking this course, may obtain the degree of E. M.

In the courses of Mineralogy, Geology and Analytical Chemistry, much attention is paid to the practical instruction of the student in determining minerals by their crystallographical and physical properties, and, by the aid of blow-pipe analysis, in the determination of rocks; in the qualitative and quantitative examination of ores and metallurgical products and in the rapid methods of assaying ores by the dry and wet ways employed in metallurgical laboratories. The vicinity to the iron works of the Lehigh Valley and especially to the works of the Bethlehem Iron Company, with its blast furnaces, foundry and machine shops, and Bessemer, puddle, iron and steel rail mills, affords unusual facilities for the practical study of iron metallurgy. The processes of the manufacture of spelter and oxide of zinc may be studied at the works of the Lehigh Zinc Company. The facilities for the practical study of mining and economic geology are hardly less great. The mines of the Lehigh Zinc Company and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the anthracite coal fields of Pennsylvania, the iron and zinc mines of New Jersey, and the celebrated iron mines at Cornwall, Pa.

## FULL COURSE IN MINING AND METALLURGY.

### *SOPHOMORE CLASS.*

#### SECOND TERM.

*Mathematics.*—Differential and Integral Calculus: Olney. (4)

*Descriptive Geometry.*—General Orthographic Projections, with practical problems. Church. (3)

*Surveying*.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles. Contour Maps. Gillespie. (3)

*Physics*.—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

*Blow-pipe Analysis*.—Lectures and Practice. Plattner, Brush, or Nason and Chandler. (1)

### JUNIOR CLASS.

#### FIRST TERM.

*Mechanics*.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

*Surveying*.—Triangulation. Leveling. Plane Table Work. Topographical Maps. Gillespie. (5)

*Crystallography*.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

*Chemical Philosophy*.—Cooke. (4)

#### SECOND TERM.

*Mine Surveying*.—Practical Work in a coal mine. (1)

*Metallurgy*.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

*Mineralogy*.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

*Blow-pipe Analysis*.—Practice. (1)

*Strength of Materials*.—Discussion of columns, beams, shafts, boilers, retaining walls, &c. (3)

*Chemical Philosophy*.—Cooke. (3)

*Chemistry*.—Quantitative Analysis. Laboratory Practice. (2)

### SENIOR CLASS.

#### FIRST TERM.

*Roofs and Bridges*.—Theory of strains, stability of structures. (3)

*Geology*.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

*Metallurgy*.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

*Chemistry*.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

*Astronomy*.—Descriptive Astronomy: Loomis. (3)

#### SECOND TERM.

*Hydraulics*.—Flow of water in pipes and rivers. Hydraulic Motors. (3)

*Steam Engine*.—The locomotive. (2)

*Mining*.—Modes of occurrence of the useful minerals. Searching for mineral deposits. Examination of mining properties. Boring. Mining tools, machines and processes. Timbering and masonry. Methods of exploitation. Callon. André. (3)

*Geology*.—Historic, Dynamic and Economic Geology. Dana. (3)

*Astronomy*.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory Work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

*Assaying*.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Laboratory Work. Ricketts. (1)

#### FIFTH YEAR.

##### FIRST TERM.

*Mining*.—Underground transportation. Hoisting, drainage and pumping. Ventilation and lighting. Mechanical preparation of ores. Coal washing. Callon. André. (4)

*Chemistry*.—Quantitative Analysis. (6)

*Christian Evidences*.—Lectures. (1)

*English Literature and History*—Lectures. (2)

*Preparation of Theses*.

#### COURSE IN METALLURGY.

##### SOPHOMORE CLASS.

##### SECOND TERM.

*Mathematics*.—Differential and Integral Calculus: Olney. (4)

*Descriptive Geometry*.—General Orthographic Projections, with practical problems. Church. (3)

*Physics*.—Galvanism, Acoustics, Light: Ganot, with Lectures and Laboratory Practice. (5)

*Blow-pipe Analysis*.—Lectures with practice. Plattner, Brush, or Nason and Chandler. (1)

*Assaying*.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Laboratory Work. Ricketts. (1)

*Structure Drawing*.—Furnaces and Metallurgical Apparatus. (2)

### JUNIOR CLASS.

#### FIRST TERM.

*Mechanics*.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometric Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

*Chemical Philosophy*.—Cooke. (4)

*Chemistry*.—Quantitative Analysis. Laboratory Work. Fresenius. (3)

*Crystallography*.—Lectures with Practical Exercises in the Determination of Crystals. (2)

*Machine Drawing*.—Elements of Machine Drawing. Working Drawings. (2)

#### SECOND TERM.

*Strength of Materials*.—Theory of columns, beams, shafts, boilers, retaining walls, &c. (3)

*Metallurgy*.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

*Mineralogy*.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

*Blow-pipe Analysis*.—Practice. (1)

*Chemical Philosophy*.—Cooke. (3)

*Kinematics*.—Principles of Mechanism. Goodeve. (2)

### SENIOR CLASS.

#### FIRST TERM.

*Roofs and Bridges*.—Theory of strains. (3)

*Metallurgy*.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

*Chemistry*.—Quantitative Analysis. Laboratory Work. (3)

*Geology*.—Lithology, with Practical Exercises in the Determination of Rocks. Lectures. (3)

*Christian Evidences*.—Lectures. (1)

*English Literature and History*.—Lectures. (2)

#### SECOND TERM.

*Hydraulics*.—Flow of water in pipes and rivers. Hydraulic Motors. (3)

*Steam Engine*.—The locomotive. (2)

*Kinematics*.—Link and Valve Motion. Auchincloss. (2)

*Chemistry*.—Quantitative Analysis. Laboratory Work. (4)

*Geology*.—Historic, Dynamic and Economic Geology. Lectures. Dana. (3)

*Preparation of Theses*.

#### POST GRADUATE COURSE FOR CIVIL ENGINEERS FOR THE DEGREE OF MINING ENGINEER.

##### FIRST TERM.

*Mining*.—Underground Transportation. Hoisting. Drainage and Pumping. Ventilation and Lighting. Mechanical Preparation of Ores. Coal Washing. (4)

*Geology*.—Lithology, with Practical Exercises in the Determination of Rocks. Dana. (1)

*Metallurgy*.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (4)

*Chemistry*.—Quantitative Analysis. Laboratory Work. (6)

*Crystallography*.—Practical Exercises in the Determination of Crystals. E. S. Dana. (1)

##### SECOND TERM.

*Mining*.—Modes of Occurrence of the useful minerals. Searching for mineral deposits. Examination of mining properties. Boring. Mining tools, machines and processes. Timbering and masonry. Methods of exploitation. (4)

*Metallurgy*.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)



*Geology*.—Historic, Dynamic and Economic Geology. Dana. (3)

*Chemistry*.—Quantitative Analysis. Laboratory Work. (3)

*Assaying*.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Ricketts. (1)

*Blow-pipe Analysis*.—Practice. (2)

## THE SCHOOL OF CHEMISTRY.

The course of instruction in this School continues the subject of Theoretical Chemistry from the general course of the two previous terms, the subject of Chemical Philosophy and Organic Chemistry being taught by daily recitations in the Junior and Senior years.

In Analytical Chemistry, the course of Qualitative Analysis in the first term of the second year is followed by preparation of Chemical Compounds and the purification of Chemicals.

Subsequently, Quantitative Analysis is pursued to the end of the course, including the Dry Assaying of Ores of gold, silver, copper, lead, iron and tin, and the Wet Analyses, included in the appended schedule. In addition, courses of Lectures on Medical, Agricultural and Technical Chemistry are given, and various industrial establishments in the neighborhood and in Philadelphia and New York are visited, in the company of an instructor. The course also includes thorough instruction in Physics and Mechanics, Mineralogy and Blow-pipe Analysis, Metallurgy, Geology and Descriptive Astronomy.

The last term of the Senior year is mainly devoted to the preparation of a Thesis on some subject, selected by the professor, involving practical work in the Laboratory, in addition to the literary labor, and each graduate will thus make a contribution to the progress of the science as a preliminary to the reception of his degree.

The course is thus seen to include thorough instruction in theoretical and applied chemistry, in their various branches, as well as, in those cognate sciences of such great value to the chemist.

The Laboratories are under the immediate charge of the Professor and his Assistant, and, together with the Lecture-room, are unsurpassed in excellence by any similar establishment in the country, being supplied with all the modern improvements. The collections of apparatus, specimens and models, illustrating theoretical and applied chemistry, are already important and rapidly increasing.



Students are charged for the chemicals and apparatus consumed. If the student is moderately careful, this expense need not exceed \$60 per year.

The graduate of this School will receive the degree of A. C. (Analytical Chemist.)

### SOPHOMORE CLASS.

#### SECOND TERM.

*Mathematics.*—Differential and Integral Calculus: Olney. (4)

*Descriptive Geometry.*—General Orthographic Projections, with practical problems. Church. (3)

*Physics.*—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

*Chemical Preparations.*—Including the Preparation of Chemical Compounds and the Purification of Chemicals by Distillation, Sublimation, Fusion, Crystallization, Precipitation, etc. (1)

*Assaying.*—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Ricketts. (1)

*Blow-pipe Analysis.*—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

### JUNIOR CLASS.

#### FIRST TERM.

*Chemical Philosophy.*—Cooke. (4)

*Toxicology.*—Otto on Poisons. (1)

*Quantitative Analysis.*—Fresenius' Quantitative Analysis. (7)

The following analyses are executed by the students:

1. Iron Wire (Fe)
2. Potassic Dichromate ( $\text{Cr}_2\text{O}_3$ )
3. Baric Chloride (Ba, Cl,  $\text{H}_2\text{O}$ )
4. Magnesian Sulphate ( $\text{MgO}$ ,  $\text{SO}_3$ ,  $\text{H}_2\text{O}$ )
5. Hydro Di-Sodic Phosphate ( $\text{P}_2\text{O}_5$ )
6. Bronze (Cu, Sn, Zn)
7. Rochelle Salt ( $\text{K}_2\text{O}$ ,  $\text{Na}_2\text{O}$ )
8. Volumetric Determination of Chlorine.
9. Acidimetry ( $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HNO}_3$ )
10. Alkalimetry ( $\text{KOH}$ ,  $\text{NaOH}$ ,  $\text{NH}_4\text{OH}$ )

11. Chlorimetry (Bleaching Powders)

12. Silver Coin (Au, Ag, Pb, Cu)

13. Zinc Ore (Zn)

*Crystallography*.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

*Anatomy and Physiology*.—Lectures. (1)

#### SECOND TERM.

*Chemical Philosophy*.—Cooke. (3)

*Quantitative Analysis*.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the students:

14. Copper Ore (Cu)

15. Spiegeleisen (Mn)

16. Lead Ore (PbS)

17. Ilmenite ( $\text{TiO}_2$ )

18. Iron Ore (Complete Analysis)

19. Limestone (Complete Analysis)

20. Coal (Volatile Matter,—Fixed Carbon, Ash,  $\text{H}_2\text{O}$ , S, P)

21. Slag (Complete Analysis)

*Metallurgy*.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (3)

*Mineralogy*.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana, (3)

#### SENIOR CLASS.

##### FIRST TERM.

*Organic Chemistry*.—Wöhler. (4)

*Quantitative Analysis*.—Fresenius' Quantitative Analysis. (5).

The following analyses are executed by the students:

22. Guano ( $\text{NH}_3$ ,  $\text{P}_2\text{O}_5$ ,  $\text{H}_2\text{O}$ )

23. Clay (Complete Analysis)

24. Manganese Ore ( $\text{MnO}_2$ )

25. Mineral Water (Complete Analysis)

26. Pig Iron (Complete Analysis)

27. Nickel Ore (Ni, Co)

28. Organic Analysis (C, H, O, N)

29. Gas Analysis (Complete Analysis of Illuminating Gas)

*Astronomy*.—Descriptive Astronomy: Loomis. (3)

*Christian Evidences*.—Lectures. (1)

*English Literature and History*.—Lectures. (2)

#### SECOND TERM.

*Chemistry Applied to the Arts*.—Lectures. (3)

*Medical Chemistry*.—Lectures. (1)

*Agricultural Chemistry*.—Lectures. (1)

*Geology*.—Historic, Dynamic and Economic Geology. Lectures.  
Dana. (2)

*Preparation of Theses*.

#### GRADUATING THESES.

Every student, in each of the Schools, will be required to present a thesis upon some topic connected with his special School, as a necessary portion of the exercises for his final examination for a diploma. These theses shall be accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

#### DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the President and Secretary of the Board of Trustees and by the Faculty of the University. For all partial courses a certificate is given showing what the student has accomplished, and is signed by the President and Secretary of the Faculty.

#### POSTGRADUATE DEGREES.

##### M. A.

The Faculty will recommend for the Degree of Master of Arts, candidates otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Arts, shall pursue for at least two years, at the University, a course of liberal study approved by

the Faculty, pass a thorough examination on the same, and present satisfactory theses.

*Ph. D.*

The Faculty will recommend for the Degree of Doctor of Philosophy, candidates otherwise properly qualified, who, after taking at this University either of the Degrees of Civil, Mechanical or Mining Engineer, or Analytical Chemist, shall pursue, for two years, at the University, a course of advanced Scientific study in the line of their profession, pass a thorough examination in the same, and present satisfactory theses.

*D. Sc.*

The faculty will recommend for the Degree of Doctor of Science, candidates otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Science, shall pursue for at least two years, at the University, a course of Scientific study, embracing two subjects approved by the Faculty, pass a thorough examination, showing in one of the subjects special attainments, and shall present satisfactory theses in one of the subjects, based upon original scientific investigation.

Candidates for any of the above postgraduate degrees or for the postgraduate degree of Civil, Mechanical or Mining Engineer, who are not graduates of this University, must give satisfactory evidence of having fulfilled the requirements for graduation in the corresponding undergraduate course. The acceptance of a certificate as evidence of proficiency, in lieu of examination, is at the discretion of each professor as to the subjects in his department.

The requirement of residence may be omitted in special cases by the Faculty.

## THE UNIVERSITY LIBRARY.

The Library Building was erected by the Founder of the University in 1877, at a cost of One Hundred Thousand Dollars, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than Twenty Thousand Dollars were contributed by the family and friends of that estimable woman, as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of \$500,000 has been given for the permanent endowment of the Library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the centre is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for Eighty Thousand Volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Eighteen thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals number about fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

#### *REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.*

- I. The Library is open every day, except Sundays and Legal Holidays, from 8 A. M. until 10 P. M.
- II. Admission is free to all persons over 16 years of age.
- III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk and receive their cards.
- IV. No book is permitted, under any circumstances, to be taken from the Library.
- V. No person is allowed to enter the alcoves, or remove any book from the shelves, without the permission of the Director.
- VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.
- VII. In taking notes, pencils, and not pens and ink, are to be used.
- VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.
- IX. Any person not conforming to these Regulations, will be denied the privileges of the Library.

- X. Any person who defaces, in any way, any book, magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

## OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an Astronomical Observatory has been erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an Equatorial Telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior Sidereal Clock, by Wm. Bond & Sons; a Zenith Telescope, by Blunt, and a Field Transit, by Stackpole. There is also a Prismatic Sextant, by Pistor & Martins.

Students in practical Astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the observatory stands, consisting of seven acres of land adjoining the original grant, was presented to the University by Charles Brodhead, Esq., of Bethlehem.

An advanced course in Astronomy and the higher Analysis has been established, requiring two years for its completion. It is adapted to the attainments of the graduates of this University, but is open to any one who may be prepared to pursue it.

This course embraces the following subjects:

First Year—Spherical Astronomy. Theory of Instruments. Method of Least Squares. Numerical Calculus.

Second Year—Celestial Mechanics. Interpolation and Quadrature. Computation of Orbits and Perturbations.

During the entire course, the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

## THE CHEMICAL AND NATURAL HISTORY SOCIETY OF THE LEHIGH UNIVERSITY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates,

and admits, by election, students from all departments of the University.

The collections of Chemical Preparations, and Botanical and Zoölogical Specimens belonging to the Society, are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures.

Among the honorary members of the Society are more than one hundred of the most distinguished scientists in Europe and the United States.

### FOUNDER'S DAY.

On the second Thursday of October of each year Commemorative Exercises are held in honor of the Founder of the University.

On Thursday, October 14th, 1880, the second celebration of Founder's Day occurred. In Packer Hall, a service, appropriate to the occasion was held and a Memorial Address was delivered by the Hon. Thomas F. Bayard, of Delaware. In the afternoon the Annual Sports of the University Athletic Association took place in the new Athletic Grounds, and in the evening there was a display of fireworks, in University Park.

### WASHINGTON'S BIRTHDAY.

This day is observed as a holiday and is usually celebrated by the students in an appropriate manner.

On Monday, February 23d, 1880, exercises were held in the chapel. Washington's farewell address was read by Benjamin Franklin Haldeman of the Junior Class, an oration was delivered by Richard Benbridge Wetherill of the Sophomore Class and there was vocal music by the University Choir.

### THE UNIVERSITY SERMON.

This Sermon is preached on the Sunday before University Day.

The Rev. Cyrus F. Knight, D.D., was the preacher on Sunday, June 20th, 1880, in the University Chapel.



## THESIS DAY.

On the day preceding University Day, the Theses prepared by the graduating class are publicly read.

### *THESES OF THE CLASS OF 1880.*

The Lowe Gas Process.

MURRAY MORRIS DUNCAN.

The Ars Poetica of Horace applied to four modern poets.

THOMAS HUGHLETT HARDCASTLE.

Review of methods employed in Mining Coal in Cross Creek Colliery No. 2, Drifton, Pa.

JOHN TINSLEY JETER.

The Chemical Reactions in the Bessemer Process, the Charge containing but a small percentage of Manganese.

CHARLES FRANCIS KING.

Review of Drawbridge over Cuyahoga River at Cleveland, Ohio.

GEORGE EARNEST POTTER.

Design for an Iron Highway Bridge to replace the old Lehigh Bridge at Bethlehem.

FRED PUTNAM SPALDING.

The Origin and Development of the English Constitution.

LEONARD BLAKSLEE TREHARN.

Discussion of the Hydraulic Ram.

BENJAMIN RUSSELL VAN KIRK.

On the best position for the Centre of Gravity in Express Locomotives.

FREDERICK COPELAND WOOTTEN.

## THE ADDRESS BEFORE THE ALUMNI

Is delivered on the evening of Thesis Day.

His Excellency Governor Henry M. Hoyt delivered the address on the evening of June 23d, 1880, in the large Drawing Room of Packer Hall.

## UNIVERSITY DAY.

This day is the last of the academic year and falls on the fourth Thursday of June. The exercises consist of orations and essays by members of the Senior Class.



The following was the order on June 24th, 1880 :

Reading of Scripture and Prayer by the Right Rev. M. A. De Wolfe Howe, D.D., LL.D., Bishop of the Diocese.

Inauguration of President Lamberton.

Salutatory,

FRED. PUTNAM SPALDING.

Essay—The History and Causes of Development of the Iron Trade.

CHARLES FRANCIS KING.

Oration—The advantages of Classical learning.

LEONARD BLAKSLEE TREHARN.

Valedictory.

THOMAS HUGHLETT HARDCASTLE.

#### *AWARD OF THE WILBUR SCHOLARSHIP*

To Charles Comstock Hopkins, Woodhull, N. Y., and honorable mention of Elmer Henry Lawall, of Bethlehem, second in rank in the Sophomore Class.

The following Degrees were conferred :

E.M. upon Abram Bruner, Philadelphia.

E.M. and A.C. upon Murray Morris Duncan, Washington, D. C.

B.A. upon Thomas Hughlett Hardcastle, Easton, Md.

E.M. upon John Tinsley Jeter, South Bethlehem.

A.C. upon Charles Francis King, Mooers, N. Y.

C.E. upon George Earnest Potter, Ashland, O.

C.E. upon Fred Putnam Spalding, Towanda.

B.A. upon Leonard Blakslee Treharn, Mauch Chunk.

M.E. upon Benjamin Russell Van Kirk, Bethlehem.

M.E. upon Frederick Copeland Wootten, Reading.

After which the Benediction was pronounced by the Bishop.

The music upon Thesis Day and University Day was by Hassler's Orchestra.

#### **THE WILBUR SCHOLARSHIP.**

This scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of \$200, awarded annually to the student in the Sophomore Class having the best record.

ALUMNI ASSOCIATION  
OF  
THE LEHIGH UNIVERSITY.

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OFFICERS.

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JUNE, 1880.

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PRESIDENT:

Caspar Wistar Haines.

VICE PRESIDENTS:

Richard Brodhead, Easton, Pa.

Lewis T. Wolle, Bethlehem, Pa.

SECRETARY AND TREASURER:

Arthur E. Meaker, Bethlehem, Pa.

ALUMNI REPRESENTATIVES IN THE BOARD OF TRUSTEES:

Wm. R. Butler, Mauch Chunk, Pa.

W. A. Lathrop, Wilkes-Barre, Pa.

(Term expires June, 1881.)

L. E. Klotz, Mauch Chunk, Pa.

W. H. Baker, Philadelphia, Pa.

(Term expires June, 1882.)

EXECUTIVE COMMITTEE:

Caspar Wistar Haines, *Chairman.*

Arthur E. Meaker,

W. A. Lathrop,

Wm. R. Butler,

L. E. Klotz,

W. H. Baker.

*MEMBERS.**CLASS OF 1869.*

- J. H. H. Corbin, A.C., Chemist, Alamosa, Col.  
 Charles E. Ronaldson, M.E., Mechanical Engineer, Siemens' Regenerative Gas Furnace, 119 South Fourth Street, Philadelphia.  
 Miles Rock, C.E., U.S. Astronomer, Geographical Survey west of 100° meridian, 1432 Chapin Street, College Hill, Washington, D. C.

*CLASS OF 1870.*

- \* L. Preston Ashmead, A.C., M.D.  
 R. Brodhead, M.E., Attorney-at-Law, Easton, Pa.  
 William R. Butler, M.E., Bookkeeper, First National Bank, Mauch Chunk, Pa.  
 George A. Jenkins, A.C., Superintendent Vulcan Steel Works, South St. Louis, Mo.  
 William J. Kerr, A.C., 2037 Mount Vernon Street, Philadelphia.  
 Harry E. Packer, A.C., Vice President Lehigh Valley Railroad, Mauch Chunk, Pa.  
 Henry B. Reed, B.A., M.D., Practicing Physician, 2300 Delancey Place, Philadelphia.  
 William D. Ronaldson, B.A., M.D., Practicing Physician, 4017 Locust Street, Philadelphia.  
 John M. Thome, C.E., Astronomer, Astronomical Observatory, Cordova, Argentine Republic.  
 Russel B. Yates, C.E., Belle, Lewis & Yates; Miners and Shippers of Clearfield Coal and Coke, 28 Main Street, Rochester, N. Y.

*CLASS OF 1871.*

- J. N. Barr, M.E., Superintendent Car-Wheel Shops, P. R. R., Altoona, Pa.  
 Frank L. Clerc, C.E., Chemist, Lehigh Zinc Works, Bethlehem, Pa.  
 H. S. Drinker, E.M., Attorney-at-Law, 210 South Fourth Street, Philadelphia.  
 Edward F. Fasset, A.C., 1530 Walnut Street, Philadelphia.  
 W. H. McCarthy, B.A., New Haven, Conn.

\* Deceased.

Waldron Shapleigh, A.C., Superintendent Kings Manufacturing Company, Freeport, Ill.

\* C. G. Weaver, C.E.

*CLASS OF 1872.*

George P. Bland, C.E., with Cofrode & Saylor, Bridge Builders, 265 South Fourth Street, Philadelphia.

D. P. Bruner, C.E., Attorney-at-Law, Harrisburg, Pa.

H. St. L. Coppée, C.E., Engineer Corps, Government Improvement of Mississippi River, Memphis, Tenn.

F. R. C. Degenhart, A.C., Chemist, Havemeyer & Bro.'s Sugar Refinery, 89 Wall Street, New York City.

Harvey S. Houskeeper, B.A., Superintendent High School, South Bethlehem, Pa.

L. E. Klotz, C.E., Robert Klotz & Co., Mauch Chunk, Pa.

O. M. Lance, A.C., Mining Engineer, Plymouth, Luzerne County, Pa.

James S. Polhemus, C.E., Wheeler's U. S. Survey, Portland, Oregon.

Hon. H. D. Scudder, C.E., Mayor of Chambersburg, Trenton, N. J.

R. Floresta de Miranda, C.E., Division Engineer, San Francisco Railroad, Province of Bahai, Brazil.

*CLASS OF 1873.*

W. H. Baker, A.C., M.D., Practicing Physician, 1610 Summer Street, Philadelphia.

R. B. Claxton, C.E., E. Claxton & Son, 930 Market Street, Philadelphia.

J. P. S. Lawrance, M.E., Assistant Engineer, U. S. Navy, 3441 Walnut Street, Philadelphia.

W. M. Scudder, M.E., Attorney-at-Law, 1001 Broad Street, Newark, N. J.

H. B. de Miranda, A.C., Professor of English, College of Para, Para, Brazil.

*CLASS OF 1874.*

C. W. Haines, C.E., Mexico and Rio Grande R. R.

W. D. Hartshorne, C.E., Chemist, Arlington Mills, Lawrence, Mass.

\* Deceased.

- Allen A. Herr, C.E., Civil Engineer and Real Estate Agent, Lancaster, Pa.  
Thos. Merritt, C.E., Engineer's office, Welland Canal, Tharold, Ontario, Canada.  
W. M. Reese, C.E., Engineer Corps, Government Improvement of Mississippi River, Memphis, Tenn.

*CLASS OF 1875.*

- Charles J. Bechdolt, C.E., Assistant Engineer Eastern Division P. R. R., West Philadelphia.  
Antonio M. Cañadas, A.C., Chemist, Quito, Ecuador.  
John E. Halbach, B.A., Lehighton, Pa.  
W. A. Lathrop, C.E., Mining Engineer, Wilkes-Barre, Pa.  
A. E. Meaker, C.E., Instructor of Mathematics, Lehigh University, Bethlehem, Pa.  
Joseph Morrison, Jr., C.E., Glendon Iron Works, Easton, Pa.  
F. S. Pecke, C.E., Draftsman, Havana, Ill.  
E. H. Williams, Jr., A.B., (Yale) A.C., E.M., Supt. R. R. and Mines, Montour Iron & Steel Co., Danville, Pa.  
C. F. Zogbaum, C.E., Assistant Superintendent Chemical Copper Works, Phoenixville, Pa.

*CLASS OF 1876.*

- F. C. Angle, C.E., Attorney-at-Law, Danville, Pa.  
J. D. Carson, C.E., D. Ward & Co., 77 Kinzie Street, Chicago, Ill.  
T. W. Frederick, M.E., Supt. Car Dep't, Pardee, Snyder & Co., Watsonstown, Pa.  
William Griffith, C.E., Engineer Corps, U. P. R. R., David City, Nev.  
C. W. Macfarlane, C.E., Supt. Foundry, William Sellers & Co., Sixteenth and Hamilton Streets, Philadelphia.  
R. W. Mahon, C.E., Johns Hopkins' University, Baltimore, Md.  
J. J. da Gama Malcher, M.E., Naval Officer, Custom House, Para, Brazil.  
W. P. Rice, C.E., Assistant to U. S. Engineer, Cleveland, Ohio.  
Henry Richards, E.M., Mining Engineer, Teabo Mine, Dover, N. J.  
L. W. Richards, M.E., Attorney-at-Law, Columbia, Pa.  
Charles L. Taylor, E.M., Chemist, Iron Works, Pittsburgh, Pa.

*CLASS OF 1877.*

- John Eagley, C.E., North Springfield, Erie Co., Pa.  
Percival D. Giess, C.E., Bethlehem, Pa.  
Andrew M. Glassel, C.E., Bowling Green, Va.  
George M. Heller, C.E., with Clarke, Reeves & Co., Phoenixville, Pa.  
Henry S. Jacoby, C.E., Engineer Corps, Government Improvement  
of Mississippi River, Memphis, Tenn.  
James F. Marstellar, C.E., L. V. R. R. Engineer Corps, Bethlehem,  
Penna.  
Seizo Miyahara, C.E., Kagoshima, Japan.  
Charles R. Rauch, A.C., Silver Plume, Clear Creek Co., Col.  
Lewis T. Wolle, C.E., Supt. Bethlehem Iron Co.'s Mines, Canada.

*CLASS OF 1878.*

- Charles Bull, M.E., Manufacturer, Hamlet Mills, Woonsocket, R. I.  
James E. Gilbert, C.E., C. M. & St. P. Railway, Upper Canton,  
Lincoln Co., Dakota Territory.  
William S. Hazlett, M.E., Zanesville, Ohio.  
Frank P. Howe, A.B., E.M., General Supt. Montour Iron & Steel  
Co., Danville, Pa.  
Nathaniel Lafon, Jr., M.E., Ohio Falls Car Co., Jeffersonville, Ind.  
Benjamin B. Nostrand, Jr., M.E., Sands Point, N. Y.  
Milnor P. Paret, C.E., Engineer's Office, James River Improvement,  
Richmond, Va.  
H. F. J. Porter, M.E., Delamater Iron Works, New York City.  
William K. Randolph, C.E., U. S. Coast Survey, 1216 K Street, N.  
W., Washington, D. C.  
Robert H. Read, B.A., Pension Office, Washington, D. C.  
Henry C. Wilson, C.E., Engineer Corps, Government Improvement  
of Mississippi River, Memphis, Tenn.

*CLASS OF 1879.*

- J. S. Cunningham, M.E., Mining Engineer, Susquehanna Coal Co.,  
Wilkes-Barre, Pa.  
J. H. Paddock, M.E., Engineer Corps, L. V. R. R., Wilkes-Barre, Pa.  
F. W. Sargent, C.E., D. & R. G. R. W. Co., Cañon City, Col.  
R. H. Tucker, C.E., Assistant, Dudley Observatory, Albany, N. Y.

*CLASS OF 1880.*

- Abram Bruner, E.M., Bethlehem, Pa.  
Murray Morris Duncan, A.C., M.E., Asst. Chemist, Cambria Iron Works, Johnstown, Pa.  
Thomas Hughlett Hardcastle, B.A., Easton, Md.  
John Tinsley Jeter, E.M., Mining Engineer, L. V. Coal Co., Ashland, Pa.  
Charles Francis King, A.C., U. S. Geological Survey, Newport, R. I.  
George Earnest Potter, C.E., Ashland, O.  
Fred Putnam Spalding, C.E., S. Pacific R. R.  
Leonard Blakslee Treharn, B.A., Instructor in Mathematics, Diocesan Military School, Reading, Pa.  
Benjamin Russell Van Kirk, M.E., Draftsman, Baldwin Locomotive Works, Philadelphia, Pa.  
Frederick Copeland Wootten, M.E., Reading, Pa.

*ASSOCIATE MEMBERS.*

- Chas. W. Roepper, '69, Chemist, Springfield Iron Co., Springfield, Ill.  
Samuel P. Sadler, Professor of General Chemistry, University of Pennsylvania, Philadelphia, Pa.

LIST OF DONATIONS  
TO THE  
VARIOUS DEPARTMENTS  
OF  
THE LEHIGH UNIVERSITY.

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DONATIONS TO THE LIBRARY.

*From the Smithsonian Institution, Washington, D. C.*

- Maps and Colored Section referred to in the Report of the State Geologist of Indiana. 1869.
- Observations on a Gold Ornament found in Florida. By Chas. Rau.
- Address on the Geological Age of the World. By J. M. Toner.
- Address before International Anthropol. Congress at Budapest. By F. F. Romer.
- Ywana Indians of Skokomish Reservation, Washington Ter. By Rev. M. Eells.
- Remains of Domestic Animals found among Post-Pleiocene Fossils in South Carolina. By Francis S. Holmes.
- Senate Doc.—Report on Fire at Smithsonian Institution.
- Report of the Secretary of Smithsonian Institution. 1878. S. F. Baird, Secretary.
- Distribution of Forests and Trees of North America. By J. G. Cooper, M D.
- Catalogue of Minerals.
- Proceedings of Academy of Natural Sciences, Philadelphia, Pa.
- Notes on North American *Falconidae*. By John Cassin.
- Experiments on Sound in relation to Fog Signals. By Joseph Henry, Secretary Light House Board.
- History and Climate of New Mexico. By Thos. A. McParlin.
- Report of Observatories. 1879.
- Irritation of the Polarized Nerve. By B. F. Lautenbach.



- Meteorological Memoirs. (S. I. Rpt. 1878.) Translated by C. Abbe.  
Change of Mexican *Axolott* to *Amblystoma*. By Aug. Weismann.  
Report of the National Museum Building Committee and Architects.  
Study of Savage Weapons at Centennial. By Edw. H. Knight.  
Shell Deposits in New Jersey. By Chas. Rau.  
Recent Researches in Sound. By W. B. Taylor.  
Reports of the Secretary of the Smithsonian Institution, 1866-77.  
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